AGILE MODELLING METHOD
ENGINEERING WITHIN OMLAB®

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THE OMLAB®.org COMMUNITY
This book draws new attention to domain-specific conceptual modeling by presenting the work of thought leaders who have designed and deployed specific modeling methods. [...] All domain-specific methods described in this volume also have a tool implementation within the OMiLAB Collaborative Environment - a dedicated research and experimentation space for modeling method engineering at the University of Vienna, [...] Number of modelling methods/tools: 25
Publisher: Springer
We are looking for further contributors!

Tentative list of contributors:

- Osvaldo Cairo (Mexico City, Mexico)
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- Robert Winter (St. Gallen, Switzerland)
- Heinz Züllighoven (Hamburg, Germany)

- Number of modelling methods/tools: approx. 25
- Publisher: Springer
NEMO 2017
CALL FOR PARTICIPATION

4th Edition of the NEMO Summer School
NEXT GENERATION ENTERPRISE MODELLING
IN THE AGE OF INTERNET OF THINGS
July 17th - July 28th, 2017 - University of Vienna, Austria
http://nemo.omilab.org

funded by:

Erasmus+
OMiLAB® Community Contributions

OMiLAB is continually searching for new collaborators. Different levels of collaboration are possible:

- Operating a full OMiLAB®
  - Provide a physical and virtual laboratory for modelling method engineering and tool development
  - Act as the primary contact for researchers in the local area
  - Provide trainings in method engineering and tool development

- OMiLAB® Associated Organization
  - Include the OMiLAB in research and education activities
    - Development of Modeling Methods
    - Publications
    - Conferences, Workshops, Tutorials, Trainings
    - Courses
    - NEMO Summer School participation and exploitation
Technological Environment consists of

- Core (Open Use): ADOxx on OMiLAB, ConceptBase
- Packaging and professional deployment capabilities
- Add-Ons (Open Source): implemented community tools such as Model Annotator, GraphRep Generator, Model Publisher, Method Publisher, OM-Repository, Meta-Model Browser, MLEA—Modelling Language Engineering Assistant

Innovation Environment provides

- Methodological guidance in the design of modelling methods
- Best practices and tools to foster efficiency
- World-wide network of modelling enthusiast and experts

Collaborative Environment provides

- Web-platform (virtual and physical accessibility)
- Community events like conferences, workshops, summer schools
- Publications like books, conference and journal papers
- Networking activities, newsletters, media and OM-TV
"Develop your own Modelling Toolkit using the ADOxx Meta Modelling Platform."

What you can do with ADOxx:

- Build your full-fledged, professional and personalized modelling tool and let it into your specific application environment.
- Develop your individual and domain-specific graphical modelling language, by developing your syntax, semantic and graphical notation for your modelling concepts.
- Use vast pre-developed functionalities to enrich your modelling language with available or self-written algorithms and mechanisms to enhance your model author to become a full-fledged modelling tool.
- Create your own professional modelling tool by packaging your code into an installable and distributable software package.
- Join, contribute or establish communities at ADOxx.org or related laboratories.

Get Modelling Tools@ADOxx:

Have a look at the following realization cases of modelling approaches from research and industrial background to get your own development started.

- BPMN@ADOxx
- UML@ADOxx
- OWL@ADOxx
- ER@ADOxx
- Download ADOxx

Further successfull practice usages of ADOxx are available at OMLab University of Vienna: http://www.omlab.org

ADOxx Event

ADOxx TRAINING SESSIONS 2015
September 23. - 25., 2015 in Vienna
November 18. - 20., 2015 in Vienna

REGISTRATION REQUIRED!
Contact us at tutorial@adoxx.org
META-MODELING AS A CONCEPT

Language
Level

Models

Level 3
Meta²-Model
Indirect model of
Generated with
Meta² Modelling Language
Describes

Level 2
Metamodel
Indirect model of
Generated with
Metamodelling Language
Describes

Level 1
Model
Generated with
Modelling Language

Level 0
Original

Language
Name

Classification

Instantiation
GOAL: Development of Modelling Toolkit

- Menubar
- Actionbar
- Explorer
- References
- Navigator
- Inspector
- Search Results
- Modelling
- Drawing Area
- Messages
The **AMME** Approach

**AGILE MODELLING METHOD ENGINEERING**
BACKGROUND: PRODUCE-USE CYCLE

Models of Concepts
(e.g., Meta-models, Terminologies, Models of domain knowledge)

Tool and Method Repository
(for domain-specific modelling)

Models that Use Concepts
(e.g., Domain-specific models, Enterprise models)

Models and Content
(domain-specific knowledge codified in diagrammatic conceptual models)
The AMME Framework

Application Environment

- People
  - Roles
  - Skills
  - Knowledge
- Organizations
  - Processes
  - Strategies
  - Resources
  - Motivators
  - Capabilities
- Systems
  - Model-aware systems
  - Enterprise architecture

Produce-Use Cycle

Models of Concepts
(Domain knowledge)

Conceptualization Lifecycle

Models that Use Concepts
(Application knowledge)

Apply (goal: usefulness)

Knowledge Assets & Resource Repository

- Foundations
  - Conceptual Framework
  - Formalisms (FDMM)
- Technology
  - Metamodelling platforms
  - Platform-independent MMDSL
- Reference content
  - Reference models
  - Reference metamodels
  - Algorithms
- Methodologies
  - Evaluation methodology

Accumulate (goal: reuse)

Modelling requirements & Domain knowledge

Reusable resources & Lessons learned

Models that Use Concepts
(Application knowledge)

Models of Concepts
(Domain knowledge)
ADOxx USAGE PATHS

ADOxx
Meta Modelling Platform

Proof of Concept
Modelling Tool Conceptualization

Open-Use
Development Environment

ADOxx
Community Edition
SUCCESSFUL MODELLING TOOL IMPLEMENTATIONS

ADOxx Horus Method
BEE-UP
BEN
BIM
BMW
CIDOC
ComVantage
COPROM
DIBA
EC
eduWeaver
eGPM
EKD
IMP2.0
Information Security
iStar
iStarSuperSet
JCS
MeLCa
MoLAP
MoSeS4eGov
OKM
OMiStarT
PetriNets
pmSOA
PROMOTE
SDbD
Secure Tropos
SemFIS
SOM
VLMV

http://www.omilab.org/psm/content/ep/globalnetworkservice?view=tilestools
OMiLAB DOMAINS

Enterprise Modeling

Business Process Management

Learning

Semantics-based Modeling

UML

BPMN

PA

DMN

Created with Wordle, http://www.wordle.net
THE START-UP WITHIN OMLAB®:

A Free Contribution for the Community
START-UP PACKAGE:
Training, Content and FAQ

Modelling Method

Implementation based on ADOxx.org

Proof of Concept

Information Channels

Free Training
Presence Trainings, Webinars

Free Implementation
Implementation Examples, Cases

Free Specification and Approach
AMME, MM-DSL, FDMM, …
### START-UP PACKAGE: Training Curriculum

#### Introduction

**Setup of Implementation Environment**

#### Modelling Language Implementation

<table>
<thead>
<tr>
<th>Classes</th>
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<tbody>
<tr>
<td>Relations</td>
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<tr>
<td>Class Attributes and Attributes</td>
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<tr>
<td>GRAPHREP</td>
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<td>ATTRREP</td>
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<tr>
<td>CLASS Cardinality</td>
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<tr>
<td>CONVERSION</td>
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<tr>
<td>Model Pointer</td>
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<tr>
<td>Attribute Facets</td>
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<td>Model Types</td>
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#### Mechanisms & Algorithms Implementation

<table>
<thead>
<tr>
<th>Core Functions for Model Manipulation</th>
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<td>Visualisation</td>
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<tr>
<td>Query</td>
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<tr>
<td>Transformation</td>
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**Configuration of ADOxx Components**

- **Visualisation**
- **Query**

**External Coupling ADOxx Functionality**

- ADOscript Triggers
- ADOscript Language Constructs
- Visualisation ADOscripts
- Visualisation Expression
- Query ADOscript
- Transformation ADOscript

**ADD-ON Implementation**

- ADOxx Web-Service
- XML / ADL Import – Export
- ADOscript Batch Mode
START-UP PACKAGE: Available Content
(Development Services, Implementation Projects)

http://austria.OMILab.org/psm/tools
START-UP PACKAGE: OMLAB® Development Tools

Example Development Tool: Graphical Representation Design
http://austria.omilab.org/psm/content/Graphrep/iframe?view=Developer-Online
START-UP PACKAGE: OMILAB® MM-DLL

- Grammar of the DSL publicly available
- Formal specification through EBNF
- Ready for custom-developed extension
- Feedback and requests to grammar are highly welcome!!

MM-DLL

Metamodelling platforms (e.g., ADOxx)

Modelling tool

http://www.omilab.org/doc/MM-DLL/1.0
EXPLOITATION OF RESULTS:

Research Projects & Education

within OMLAB®
A collection of "classical" modelling languages employed in different domains, e.g. software and systems modelling, business process modelling, and data modelling.

The tool aims to be support university teachers in basic conceptual modelling courses. It currently supports the following modelling languages:

- **Business Process Model and Notation 2.0 (BPMN)**
- **Event-driven Process Chains (EPC)**
- **Entity-Relationship (ER)**
- **Unified Modeling Language 2.0 (UML)**
- **Petri-Nets (PN)**
OMiLAB® encourages and supports students in writing their thesis in topics related to method conceptualization, metamodelling, digitalization, and tool development.

• PhD Theses, e.g.,

• Master Theses, e.g.,
  – ‘Conceptualization and Implementation of a Constraint-Modeling Language’
  – ‘Integrating Natural Language Processing with Semantic-based Modeling’
  – ‘The business rules method - a modelling method for adaptive processes’
Use Case: Interact with different real world objects
Approximation Problem: Items have a complex shape in 3 dimensions

Use Case: Assemble a product by incorporating components
Planning Problem: Reaching a state in a complex environment

Use Case: Capture characteristics of a system without irrelevant details
Modeling Problem: Finding the right degree of domain specificity

Use Case: Enable new experiences for users with context aware devices
Sensor Fusion Problem: Integrate sensor information in a consistent model
RESEARCH PROJECTS: Digital Transformation

Use Case: Interact with different real-world objects
Approximation Problem: Items have a complex shape in 3 dimensions

Use Case: Assemble a product by incorporating components
Planning Problem: Reaching the goal state in a complex environment

Use Case: Capture characteristics of a system without inherent details
Modeling Problem: Finding the right degree of domain specificity

Use Case: Enable new experiences for users with context-aware devices
Sensor Fusion Problem: Integrate sensor information in a consistent model

Use Case: Simulation of a delivery process in warehouses
Ontology: Semantic Annotations using the SemMIS modelling toolkit

Use Case: Learn and play a simple piano song
Genetic Algorithm: Learning the keys in the correct order

Use Case: Construct a domain-specific modeling method
Metamodelling: Service-based ADDxx extension with scripts

Use Case: Mixing a cocktail by receiving speech input
Integration: Combine different technologies, models, and methods

Use Case: Towers of hanoi with three discs
Constraint Satisfaction: Formulate the puzzle as a Constraint Satisfaction Problem

Use Case: Conceptual model of communication
Metamodelling: New Library in ADDxx including GraphIcons

Use Case: Autonomous movement of robots
Fuzzy Logic: Handle fuzzy sensor data input

Use Case: Plot graphrep as scalable SVG image
Auto Engine: Parse XML markup and control actuators

http://austria.omilab.org/psm/omirob
THANK YOU FOR YOUR ATTENTION!

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